Trade Mission to China
Foreign Trade Administration
Ministry of Industry, Trade & Labor

Water Resources in China – Facts and Figures*

I. BACKGROUND

China is a country in water shortage and its average water resource capacity per person is only 1/4 of the world. Due to the economic and social development as well as the speedy development of China's industrialization and urbanization, the problem of water shortage and water pollution have become an important factors in hindering the further economic and social development in China.

General Climate

The average annual precipitation in China is 648 mm, or 19% less than the world average 800 mm on land, and the volume of average annual precipitation is 6190 billion m3. The regional distribution of precipitation is very uneven, showing a general trend of gradually descending in magnitude from the southeastern coastline to the northwestern hinterlands. The annual precipitation in the southeastern coastal areas and parts of the southwestern areas is more than 2000 mm, but that in the northwestern China is usually less than 200 mm, and 50 mm in the Tarim and Turpan basins in Xinjiang and Chaidamu Basin in Qinghai, etc, even less than 25 mm at centers of those basins.

As affected by the monsoon climate, the precipitation shows not only a big inter-year variation, but also wet spans and dry spans, and inter-year variation is bigger in areas or for seasons with less precipitation. The ratio of maximum annual precipitation to minimum at observation station has the biggest value in the northwestern China, possibly exceeding 8, but only has values ranging 2-3 or less than 2 in the southern and southwestern China. Except in a few small special areas, precipitation is usually concentrated in summer and mainly occurs in rainstorms. In most of the areas, the ratio of average maximum precipitation of four consecutive

months to average annual total ranges 60-80% from the south to the north.
The average annual evaporation from water surface also varies greatly over regions, with the lowest value being only 400 mm, and the highest up to 2600 mm. The low values mainly occur in mountainous areas and the high ones on plains and plateaus. The average annual land evaporation also shows a trend similar to precipitation, descending in magnitude from the southeast to the northwest. It has a value of 700-800 mm in the eastern areas and usually less than 300 mm in the western areas.

Rivers and River Basins

China has a large number of rivers with a total length of 420000 km. There are more than 50000 rivers each with a drainage area of more than 100 km2 and more than 1500 each with a drainage area of more than 1000 km2. As affected by the topography and climate, the rivers are distributed very unevenly over regions. Most of the rivers are situated in the wet eastern monsoon climatic zone, directly flowing into the sea, with the major ones including the Yangtze, Yellow, Heilong, Pearl, Liaohe, Huaihe, Haihe, etc. The northwestern China is dry with slight precipitation, and has only a small number of rivers, most of which are inland ones without connection to sea, and there are also large none-runoff areas.

The whole country may be divided into nine major river basins, including Yangtze, Yellow, Haihe, Huaihe, Songhua-Liaohe, Pearl, Southeast Rivers, Southwest Rivers and Inland Rivers, by combining a large river with nearby smaller rivers flowing directly to the sea or out of the region or by combining a number of neighboring rivers in a region. The Songhua-Liaohe, Haihe, Yellow, Huaihe and Inland Rivers are practically situated in the northern areas of China and the Yangtze, Pearl, Southeast Rivers, Southwest Rivers in the southern areas (see attached figure in Annex).

II. WATER RESOURCES

Water Resources are referred to the fresh waters that are renewable, closely related with uses by human societies and ecosystems, including both surface water and groundwater with precipitation being the main source of recharge.

1. Surface Water Resources

The volume of surface water resources is referred to the dynamic volume of water in rivers, lakes, glaciers, etc and generally expressed in volume of natural river runoff. The volume of annual river runoff in the country is 2711.5 billion m3, equivalent to a depth of 284 mm over the whole land area. The direct recharge by precipitation accounts for about 71% of this volume, and indirect recharge by precipitation via aquifer 27% and recharge by glacier and snow melt 2%.

The depth of natural river runoff, which depends on precipitation and conditions of watersheds, gradually descends in magnitude from the southeast towards the northwest, having values of more than 1000 mm in some southeastern areas and values of less than 10 mm in some western areas. The total volume of river runoff in the five northern river basins account for less than 20% of the national total, but the four southern river basins account for more than 80% of the national total.

The river runoff shows inter-year variation similar to precipitation, but to a bigger extent with the impacts of watershed. The ratio of maximum annual runoff to minimum usually has a value of less than 5 in the southern areas, but may exceed 10 in the northern areas. The intra-year variation of river runoff is also big as affected by the size of river basin as well as intra-year variation of precipitation. The rivers in the northern areas show a bigger intra-year runoff variation with the maximum runoff of consecutive four months accounting for more than 80% of the annual total in some areas, and this ratio has a value of about 60% for rivers in the southern areas.

Table 1 Average annual river runoff by river basin

River basin	Runoff depth (mm)	Runoff volume ($10^9 m^3$)	Percentage of national total (%)
China	284	2711.5	100.0
Songhua-Liaohe	132	165.3	6.1
Haihe	90	28.8	1.1
Huaihe	225	74.1	2.7
Yellow	83	66.1	2.4
Yangtze	526	951.3	35.1
Pearl	807	468.5	17.3
Southeast Rivers	1066	255.7	9.4
Southwest Rivers	687	585.3	21.6
Inland Rivers	35	116.4	4.3

2. Groundwater Resources

The volume of groundwater resources is referred to the dynamic volume of water in aquifer that is directly related with precipitation and surface water via recharge and/or discharge. Most of runoff formed by precipitation flows into rivers, but there is a part of runoff that percolates into underground to form groundwater. The volume of groundwater resources is usually expressed in terms of volume of groundwater recharge. As activities of human beings affect groundwater recharge to some extent, the volume of groundwater resources is defined under specific conditions of development and utilization of water resources.

The annual volume of groundwater resources in China is 828.8 billion m3, in which groundwater in mountainous areas occupies 676.2 billion m3 and that in plain areas

187.4 billion m3 with 34.8 billion m3 of overlapping volume between them. Most of groundwater in mountainous areas flows out as base flow of rivers, thus overlapping with surface water resources and being mainly exploited as surface water. The groundwater resources in plain areas are mainly in the northern areas and the five northern river basins occupy 78.8% of national groundwater resources in plain areas. Table 2 shows groundwater resources by river basin.

Table 2 Annual groundwater resources by river basin Unit: 10^9 m^3

River basin	Mountainous area	Plain area	Overlapping volume	Groundwater resources
China	676.2	187.4	34.8	828.8
Songhua-Liaohe	31.9	33.0	2.4	62.5
Haihe	12.5	17.8	3.8	26.5
Huaihe	10.7	29.7	1.1	39.3
Yellow	29.2	15.7	4.3	40.6
Yangtze	221.8	26.1	1.5	246.4
Pearl	102.8	9.3	0.5	111.6
Southeast Rivers	56.2	5.2	0.1	61.3
Southwest Rivers	154.4			154.4
Inland Rivers	56.7	50.6	21.1	86.2

3. Total Water Resources

Total water resources in a region are referred to the total yield of surface water and groundwater formed by local precipitation. Surface water interacts with groundwater with the river base flow formed by groundwater and part of groundwater recharge coming from percolation of surface water. In calculating total water resources the overlapping volume between them should be deducted.

With 2711.5 billion m3 of annual river runoff, 828.8 billion m3 of annual groundwater resources and 727.9 billion m3 of overlapping volume between them, the volume of

total water resources in China is 2812.4 billion m3. The five northern river basins totally have 535.8 billion m3 of annual total water resources, accounting for 19% of the national total, and the four southern river basins 2276.6 billion m3, 81% of the national total. Table 3 shows the annual total water resources by river basin.

Table 3 Annual total water resources by river basin

River basin	Surface water resources ($10^9 m^3$)	Groundwater resources ($10^9 m^3$)	Total water resources ($10^9 m^3$)	Water yield module ($10^3 m^3/km^3$)
China	2711.5	828.8	2812.4	294.6
Songhua-Liaohe	165.3	62.5	192.8	155.6
Haihe	28.8	26.5	42.1	132.4
Huaihe	74.1	39.3	96.1	289.5
Yellow	66.1	40.6	74.4	93.0
Yangtze	951.3	246.4	961.3	534.4
Pearl	468.5	111.6	470.8	816.0
Southeast Rivers	255.7	61.3	259.2	1080.8
Southwest Rivers	585.3	154.4	583.3	687.5
Inland Rivers	116.4	86.2	130.4	38.6

4. Characteristics of Water Resources in China

（1）Small per capita volume

The total volume of water resources in China ranks sixth among all the countries in the world, but, because of the huge population, the per capita volume of water resources is small, about 2200 m3, only equivalent to 1/4 of the world average. Particularly, in the Haihe, Huaihe and Yellow river basins the per capita volumes of water resources are only 290 m3, 478 m3 and 633 m3, respectively. The small per capita volume of water resources decides that stress on water will be long lasting in some areas.

（2）Great inter- and intra-year variation of river runoff

As mentioned above, the river runoff varies greatly from year to year with the ratio of maximum annual runoff to minimum exceeding more than 10 in some areas. In addition, some major rivers have seen consecutive dry years and wet years. For example, the Yellow River once saw a low flow span of 11 years from 1922 to 1932 with an average annual flow 24% less than the normal one, and also saw a wet span of nine years from 1943 to 1951 with an average annual flow 19% more than the normal one. The river runoff is also unevenly distributed within the year. Those features of spatial distribution are among the important causes for the frequent occurrence of drought, flood and waterlogging hazards, hence unstable agricultural production and serious imbalance between water supply and demand.

（3）Inconsistency between distributions of water resources and productivity over regions

The water resources in China are distributed unevenly in space, rich in the southern areas and poor in the northern areas, which is inconsistent with the distribution of population, farmland and economy. The four northern river basins account for 46% of the national population, 45% of the national GDP, 65% of the national farmland, 59% of the national irrigated farmland, but less than 20% of the national water resources and the per capita volume of water resources is only 1/3 of that in the southern river basins. The plain areas in the lower reaches of the Yellow, Huaihe and Haihe rivers account for 1/3 of the national GDP and industrial output, but only 7.7% of the national water resources, while the Southwestern Rivers accounts for 21.3% of the national water resources, but only 0.7% of the national GDP and industrial output.

III. CURRENT STATUS OF DEVELOPMENT AND UTILIZATION OF WATER RESOURCES

1. Water Resources Engineering

China is among the countries with the longest history of building water resources

projects in the world. Among the splendid historical achievements are the legendary flood harnessing lead by Great Yu, construction of flood prevention embankments along the Yellow during the Spring and Autumn Period, Grand Canal, Dujiang Weir irrigation system, etc, all showing the importance of water resources engineering in the development of the Chinese nation. But the history of water resources shows alternating rises and downfalls, in particularly in modern history, China frequently suffered invasion by foreign countries, which, plus a corruptive government and extensive poverty, made development of water resources engineering stagnated. After the founding of P. R. China, construction of water resources engineering on an unprecedented scale was carried out. Up to 2000, 85000 dams had been constructed with a total storage capacity of 518 billion m3, in which 397 are large-sized with a total storage capacity of 326.7 billion m3，2634 medium-sized with a total storage capacity of 72.9 billion m3. The engineering achievements also include 270000 km of embankments and 7900 km of sea embankments, either constructed or consolidated, including 65700 km of major embankments; 31742 sluices, including 340 large-sized and 2836 medium-sized; 98 flood storage or detention zones for the Yangtze, Yellow and Huai rivers, etc, with a total area of 34500 km2 and a total storage capacity of 100 billion m3.

2. Current Status of Development and Utilization of Water Resources

The general degree of exploitation of water resources in China is at present not very high, but, because of the inconsistent distributions of water resources and productivity, the status of development of water resources varies greatly with river basins, in some of which water resources are under great stress. According to statistics 2002, the total water use in China was 549.7billion m3，in which surface water occupied 440.4 billion m3 or 80.1% of the total，groundwater 107.2billion m3 or 19.5% of the total，and other water sources 2.1 billion m3. The water use in some river basins includes water transferred from other river basins. For example, 4.6 billion m3 of water was transferred from the Yellow to the Haihe, and 6.09 billion m3 and 2.03 billion m3 from the Yangtze and Yellow to the Huai, respectively. Besides, the water used in a year also depends on available water storage at end of

last year, precipitation and river flow in the current year, etc. Nevertheless, the ratio of water use in 2000 to volume of water resources still may be used to roughly indicate the current degree of exploitation of water resources in a river basin。By using this ratio, it is shown that the degree of exploitation of water resources in China is about 19.5%, and the Haihe, Huaihe and Yellow river basins all have a very high or high degree of exploitation of water resources.

Table 4 Water uses in 2000 and degree of exploitation of water resources by river basin

River basin	Water use (10^9 m^3)				Water resources (10^9 m^3)	Degree of exploitation (%)
	Surface water	Groundwater	Others	Total water use		
China	440.436	107.242	2.049	549.728	2812.4	19.5
Songhua-Liaohe	30.751	25.853	0.00	56.604	192.8	29.4
Haihe	12.795	27.017	0.171	39.983	42.1	95.0
Huaihe	42.084	18.947	0.187	61.218	96.1	63.7
Yellow	25.130	13.544	0.187	38.861	74.4	52.2
Yangtze	159.368	8.174	0.689	168.231	961.3	17.5
Pearl	80.502	4.169	0.408	85.078	470.8	18.1
Southeast Rivers	30.886	0.895	0.150	31.931	259.2	12.3
Southwest Rivers	9.933	0.278	0.119	10.330	583.3	1.8
Inland Rivers	48.988	8.365	0.138	57.491	130.4	44.1

In the national water use of 549.7billion m3 in 2000, 373.6 billion m3 was for agriculture, accounting for 68% of the total, and 90.3% of agricultural water use was for irrigation; 114.2 billion m3 was used for industries, accounting for 20.8%, 61.9 billion m3 for domestic uses, accounting for 11.2%. Agricultural irrigation is the biggest water user, but according to trend of development, water use by agricultural irrigation has more or less declined since the 1980s, while industrial and domestic water uses have increased rapidly.

During the process of water conveyance and uses, some volume of water is consumed via evaporation and transpiration, soil absorption, product absorption, uses by residents and livestock, etc and hence cannot return to surface water or groundwater, thus called "water consumption". The national water consumption in 2000 was 298.5 billion m3, accounting for 54% of the national water use. Among the various kinds of water uses, the rate of water consumption was 68% for agricultural irrigation, 24% for industries, 24% for urban domestic uses, and 88% for rural domestic uses.

Table 5 Water uses and water consumption by river basin

River basin	Agriculture ($10^9 m^3$)	Industry ($10^9 m^3$)	Domestic ($10^9 m^3$)	Total water use ($10^9 m^3$)	Water Consumption ($10^9 m^3$)	Consumption rate (%)
China	373.618	114.236	61.874	549.728	298.5	54
Songhua-Liao he	40.825	10.517	5.262	56.604	31.0	55
Haihe	28.649	6.179	5.154	39.983	27.9	70
Huaihe	44.739	9.321	7.158	61.218	39.3	64
Yellow	29.896	5.472	3.493	38.861	22.0	57
Yangtze	93.389	53.290	21.552	168.231	76.2	32
Pearl	54.916	18.256	11.907	85.078	39.3	46
Southeast Rivers	18.439	9.011	4.481	31.931	16.5	52
Southwest Rivers	8.757	0.642	0.932	10.330	7.1	69
Inland Rivers	54.007	1.548	1.935	57.491	39.0	68

IV. ACHIEVEMENTS AND PROBLEMS IN DEVELOPMENT AND UTILIZAITON OF WATER RESOURCES

Great achievements have been made in China in the development and utilization of water resources and control of water related hazards, which plays an important role in providing guarantee for the economic and social development, protecting the life

and property of the people and maintaining stable operation of economy. In the last more than 50 years, the capacity of water supply in China has increased by about 5 times to enable the industrial and agricultural development and improvement of people's livelihoods. China is a large country in terms of population and agriculture, and provision of grain is concerned with the national economy and the people's livelihoods. In the more than 50 years the area of irrigated farmland has increased by 2.5 times and the grain yield by 3.8 times, and the needs by a population accounting for 21% of the world total for grain and other agricultural products have been satisfied with farmlands accounting for 9% of the world total. A flood control system capable of preventing ordinary floods has been formed by constructing water resources complexes, heightening and consolidating embankments, training river channels, opening up flood diversion and retention zones in lower river reaches, etc, thus greatly enhancing the capacity against floods. At present, the water resources projects in China provide protection for 465 million people, 39.3 million hm2 of farmland, more than 600 cities and a lot of infrastructure such as railways, roads and oil fields. Safety against flood has also been achieved for the Yellow, which frequently caused flooding disasters in history, in more than 50 years. China has the biggest potential of hydropower in the world, with an exploitable quantity of 378 GW. Up to now, about 80 GW has been developed, accounting for 25% of the national installed capacity of power generation, and corresponding to an annual power output of 2200 TWh, which can replace 140 million t of coal and is equivalent to reduction of 80 million t of CO2 emission, thus achieving significant environmental benefits.
But problems still exist in the development and utilization of water resources in China, including:

1. A Big Gap between Water Supply and Demand

Because the per capita volume of water resources is small and there is a great variation of water resources in time and space, and the demand for water continuously increases with the growth of population, development of urbanization and industrialization, the gap between water supply and demand in China has become increasingly wide. At present, the annual agricultural water shortage in the

whole country is about 30 billion m3, and the annual average areas of farmland affected by drought is 20 million hm2, resulting in an grain yield reduction of 10 billion kg to 25 billion kg，or even up to 50 billion kg in a year of serious drought. The annual shortage of urban and industrial water is about 6 billion m3， resulting in an industrial output reduction of 230 billion yuan. Among the 660 cities in the country there are more than 400 suffering water shortage, affecting 160 million people. In addition, there are more than 24 million rural people without access to adequate drinking water supply. In particular, in the plain areas in the lower reaches of the Yellow, Huaihe and Haihe rivers, the average per capita water use is only 332 m3 and the annual water shortage is up to 18 billion m3，ranking the areas among those with the most serious water shortage in the whole country.

2．Serious threats of flooding

The flood control system in China is still imperfect with low standard and capacity for flood control. Most of the current embankments along the major rivers only have a flood prevention standard of 10 to 20 year flood, of the cities at and above the prefecture level, only 17% can reach the originally defined flood prevention standard. The development of flood storage and detention zones has lagged behind to result in difficulties in their application. Since the 1990s, particularly, extraordinary floods have continuously occurred to the major rivers to result in a total economic loss of 1000 billion yuan, in which the floods occurring to the Yangtze and Songhua rivers in 1998 caused a direct economic loss of more than 250 billion yuan. So the work of flood control is still very arduous for China.

3． Low water use efficiency

In the last more than 20 years, China has made great efforts to promote water use efficiency and achieved significant progress, but there is still a big gap as compared with advanced level in the world. For example, in 2000, the national integrated irrigation water efficiency was 0.43, but the advanced irrigation water efficiency of foreign countries is above 0.7; the rate of industrial water reuse in China was 0.55, but the advanced one of foreign countries is 0.75 to 0.85. As agriculture accounts for

70% of the total water use in China and the tertiary industry holds a small proportion in all industries, so GDP per unit volume of water use in China is even farther behind the advanced level in the world.

4．Worsening Pollution，

The natural quality of river flows in China is generally good, but the rivers have been polluted to a varying extent as affected by human being's activities and increasing discharge of domestic, industrial and agricultural wastes. According to statistics, the total discharge of sewage and wastewater was 62 billion t in 2000，of which only 24% was treated collectively up to the national standard, and the rest was not treated or treated but not up to the national standard before discharged or used for farmland irrigation. In the river reaches of about 100000 km for evaluation in the whole country, grade IV or worse account for 47%; and more than 75% of the lakes have been polluted. An investigation on drinking water of 118 cities indicates that groundwater has been polluted to a varying degree in 97% of the cities, 64% out of which have seriously polluted groundwater. Water pollution has caused ecological deterioration, declined water quality in rivers, lakes and reservoirs, reduced the value of water for use and hence made water shortage more serious.

5. Soil Erosion and Ecological Deterioration

China is among the countries in the world with the most serious soil erosion. In addition to natural factors, activities of human beings have also increased soil erosion. Since the founding of P. R. China, the Chinese government has invested a lot of resources in soil erosion control, but the trend of worsening soil erosion and ecology has not been fundamentally checked. According to the second national survey on soil erosion based on remote sensing, the current area of soil erosion in the whole country is 3.56 million km2，accounting for 37% of the national land area. In some areas, particularly the western areas, development of ecological deterioration has not been fundamentally altered. At the same time, there is the phenomenon that damaging activities coexist with remedy efforts.

China is a country with a large number of wetlands of complete types. But with the pressure from population growth and economic development, the wetlands have been damaged to a varying extent. In the last decades, the total area of lakes in the whole country has been decreased by 1.30 million hm2, and on the average 20 lakes have disappeared each year. The degree of exploitation of river flow is more than 50% for most of the major rivers, thus resulting in silting up of river channels or mouths, drying up of middle or lower reaches, drying up of lakes in lower reaches, reduction or disappearing of natural vegetation, desertification, serious damage to aquatic lives. Groundwater overdraft has created 72 depression cones in the whole country, with a total area of 61000 km2，hence resulting in ground subsidence, cracking and other geological hazards or environmental problems.

V. COUNTERMEASURES

Flood and waterlogging, drought and water shortage, water pollution, soil erosion and ecological deterioration have become serious restricting factors to sustainable development in China in the 21 century. Facing those challenges, the Chinese government has summarized the lessons from water resources management and put forward a new thinking to implement sustainable approaches to water resources management in order to support sustainable economic and social development. The essence of the new thinking is the harmony between human beings and nature, requiring changes of traditional ideas and behaviors. The first change is to shift from the concept that water cannot be exhausted to the concept that fresh water is a limited and vulnerable resource, and from that water is a free natural resource to that water is an important strategic economic resource. The second change is to shift from unboundedly developing and using water resources without consideration of ecological needs to paying attention to ecological use and rationally arranging domestic, productive and ecological water uses. The third is to from simply emphasizing flood control and prevention to coordinated relationship between human beings and nature to reserve necessary room for flood flow and storage, and make use of flood water as far as possible with the prerequisite of safety against flood. The fourth is to shift from biased emphasis on development, utilization and harnessing of

water to coordinated development, utilization, harnessing, allocation, conservation and protection with the focus gradually moved to rational allocation, high efficiency utilization and effective protection. The fifth is to shift from separation between water resources and the economy and society to basing population growth, economic structure and layout of productivity, development scale and speed on carrying capacity of water resources and seeking coordinated development of population, resources, economy, society and environment. The sixth is to shift from only depending on engineering measures to integrating engineering, and legal, administrative, economic and technical measures and from engineering planning to strategic integrated water resources planning. The seventh is to shift from only using surface or groundwater resources to jointly using surface water, groundwater, rain water, flood water, low quality water, reclaimed wastewater, direct use of sea water, desalinized sea water, etc. The eighth is to shift from water supply management that only pays attention to satisfying demand to water demand management that applies multiple measures to rationally check demand.

Following this new thinking, the Chinese government is adopting a series of measures to improve and strengthen water resources management, including: Strengthen legislation and implement water resources management by law. The revised Water Law was issued in 2002 and clearly provides adoption of a system of water administration based on combined river basin administration and administrative division administration; and provides the systems of water resources planning, river flow allocation, water function zoning and management of total pollutant discharge, water abstraction permitting, paid use of water resources, water saving, progressive pricing for above-norm uses, and supervision and monitoring of law enforcement, etc.

Implement reform of system of water administration. Since 1998, the Chinese government has adjusted responsibilities of governmental departments in order to stop fragmentation and strengthen integrated water resources management. At present, the government is improving step by step the system of combined river basin management and administrative division management within the framework of integrated water resources management, in which the department of water

administration of government at each level is in charge of integrated management and supervision and river basin authorities have been established in all major river basins and implement water administration on the river basin basis on behalf of the Ministry of Water Resources. At the same time river basin approach to water resources management is being extended to other rivers, and in some provinces river basin authorities have been established for some rivers within provincial boundaries.

Strengthen water resources planning. The aim of water resources planning is provide the basis for integrated water resources management and sustainable utilization. In 2003, the national integrated water resources planning started with the main contents including water resources assessment, investigation and evaluation of development and utilization of water resources, water demand forecasting, water saving, water resources protection, water supply forecasting, water resources allocation, overall layout and implementation planning of water resources engineering, evaluation of plan implementation, etc. Efforts are also being made on formulation of other special plans.

Develop a water conservation society. In order to advance the development of a water conservation society in China, MWR started implement pilots of water saving society for the country. According to the unified arrangement by MWR, the pilots will be implemented in two steps in the period from 2001 to 2010. The first step is to implement pilots in areas with serious water shortage, water pollution, hence suitable for the demonstrative purpose. The second step is to implement pilots on provincial and river basin basis to set up demonstrative areas of water conservation society for provinces and river basins. It is expected that a complete set of theories and experiences will be worked out to provide the basis for the development of water conservation society in the whole country.

Implement water price reform. In recent years, in order to achieve sustainable use and rational allocation of water resources, policies and measures have been adopted for water price reform in order to give play to economic leverage of water prices in

market based regulation and allocation of water, and significant benefits of water saving have been achieved. In July 2003, the National Development and Reform Commission and MWR jointly issued the Regulation on the Management of Water Supply Price for Water Resources Project. The water pricing has been gradually implemented that is based on the principle of cost compensation, rational profit, high price for quality water and fair sharing of cost, with prices to be adjusted timely according to the cost of water supply and the change of market demand. Progressive pricing for over consumption and seasonally floating water price will be extended, and so will the system of basic water price integrated with volumetric water price.

Implement unified operation of water resources to improve the ecology. In recent years the Chinese government has implemented unified operation and allocation of water resources for the Tarim, Heihe and Yellow rivers, which have serious water scarcity and a deteriorating ecology, and thus has effectively solved the drying up of lower reaches of those rivers as caused by excessive exploitation of water resources and improved the ecology. The operation covered more than ten provinces, municipalities and prefectures, used tens of thousands of persons, and affected a total land area of about 2 million km2, and the total length of channels for water delivery was more than 2000 km. No drying up has occurred to the Yellow River for four years since then; water allocation has been successfully made for the Heihe River for four years to deliver water to the terminal lakes East Juyanhai and West Juyanhai; and emergent water delivery has been made for the Tarim River for five times and water has been delivered to the terminal lake Taitema. MWR already proposed to the State Council to include the Regulation for the Unified Operation of Water Resources for the Yellow River in the legislation program of the State Council in 2004. The project for harnessing the Heihe with a total investment of 2.35 billion yuan and that for harnessing the Tarim with a total investment of 10.7 billion yuan are being implemented.

In addition, the construction of the South-to-North Water Diversion Project already started in order to alleviate water shortage in the northern part of China, and studies

are being actively implemented on water right allocation, water market, integrated management of urban water affairs, etc.

* Based on information of the Ministry of Water Resources, P.R. China